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Research Paper

The Canadian Productivity Review

The 2001 to 2004 Revisions of the Canada–U.S. Labour Productivity in the Business Sector

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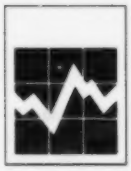

Statistics Canada
Micro-economic Analysis Division

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Mustapha Kaci and Jean-Pierre Maynard

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Abstract

This paper examines the revision cycle for labour productivity estimates over the period from 2001 to 2004.

1. Introduction

The estimates of labour productivity (output per hour worked) that are produced by the Canadian Productivity Accounts are subject to two types of revisions.

The first is a set of short-term revisions in gross domestic product (GDP) that take place over a four-year cycle. This set of revisions follows those that the System of National Accounts (SNA) pursues for its preliminary estimates of GDP.[1] A preliminary estimate of GDP that is first released for year t is revised annually over the three subsequent years (t+1 to t+3) as additional data become available to the SNA.

Initially, estimates of GDP at the industry level come from projecting past estimates using a small number of readily measured series (for example, the GDP in Taxi and Limousine Services is projected off the Labour Force Survey [LFS] estimate of employment growth in these industries). The industry estimates are gradually supplemented by far more detailed and accurate data that are obtained from surveys such as the Annual Survey of Manufactures and the Unified Enterprise Survey, and from administrative tax records that become available after a lag of several years. Estimates of GDP that are calculated from final demand are also initially projected from sources that are eventually replaced by more comprehensive information. For example, preliminary data on expenditures that come from retail surveys are eventually updated with the more comprehensive Survey of Household Spending data. Preliminary data on non-residential construction that are projected using employment in construction are updated later with data from an investment survey.

In addition, the labour productivity estimates for year t are revised in year t+1 as new information becomes available to improve the first estimates of employment and hours worked that are made using the LFS. These revisions improve the estimates of holidays and other non-random events.[2] Revisions also occur if the employment estimates for the non-commercial sector that are derived from the Public Institutions Division and the Survey of Employment, Payrolls and Hours are revised, since the business sector estimate is obtained residually after removing the non-commercial sector.

The second type of revisions occurs less frequently. The SNA occasionally experiences major revisions due to historical updates, classification changes (for example, the movement from the Standard Industrial Classification to the North American Industry Classification System), or the introduction of conceptual and methodological changes. The latter occur when the SNA updates the method used for measuring certain industries, perhaps because of changes in the international standards to which it adheres (SNA93). For example, in the year 2000, Statistics Canada included software expenditures as investment for the first time.[3] When Laspeyres price indices

1. For more details on "The 2001-2004 revisions of the Income and Expenditure Accounts" see the *Canadian economic accounts quarterly review: First quarter 2005*. Catalogue no. 13-010-XIE, Vol. 4, no. 1, Ottawa: Statistics Canada, p. 55–65.
2. See Jean-Pierre Maynard, *Annual Measure of the Volume of Work Consistent with the SNA: the Canadian Experience*. Economic Analysis Methodology Paper Series: National Accounts. Catalogue no. 11F0026MIE2005005. Ottawa: Statistics Canada.
3. The United States had made this change the year before.

were used to calculate constant dollar GDP, the base year from which weights were derived was updated every five years; this resulted in periodic revisions to growth rates. In addition, changes in analytical techniques, such as shifting to Fisher chained indices, have introduced revisions in the labour productivity estimates. Historical revisions also occur in the employment data when the LFS is occasionally re-benchmarked to Census of Population data.

In this paper, we compare recent revisions in the labour productivity estimates in Canada and the United States. These regular revisions to preliminary estimates extend back four years.

Revisions of labour productivity estimates have recently (June 2005) been made in Canada in order to incorporate the latest available GDP estimates published by the National Economic and Financial Accounts.[4,5] These revisions relate to the last four years (2001 to 2004). The revisions back to 1997 are presented in Tables 1a, 1b and 1c, which show a picture of the evolution of the estimates over the last seven revision rounds since 1997. It should be noted that the revisions to the 2002 to 2004 estimates for Canada are not yet completed. This is also the case for the years 2003 and 2004 in the United States. The shaded cells include the estimates during the first four-year revision cycle. Other revisions outside these shaded areas are due to the other sources of revisions outlined above.

For the purposes of this paper, we focus our attention on the effect of revisions for two periods—1981 to 2000 and 2000 to 2004 (see Table 2). The latter period is less than a business cycle in length and covers the years since the end of the previous peak in productivity growth. It also corresponds to the period (except for 2000) when only preliminary estimates of GDP are available. The first period contains estimates that are past the preliminary revision cycle. It essentially covers two business cycles and therefore provides a comparison of differences in long-term trends between Canada and the United States.[6] Productivity estimates of short-term changes are generally more volatile than estimates of changes over the long term.

2. Revisions for 2001 to 2004

In general, the revisions of Canadian data for the period from 2001 to 2004 that were published in *The Daily* on June 9, 2005, resulted in almost no change from previous estimates. However, revisions of American data for the 2002 to 2004 period that were published in *News* of the Bureau of Labor Statistics on August 9, 2005, resulted in a decrease in the growth rate of labour productivity in the United States for each of the last three years of this period. The downward revisions range from 0.3% for 2002 to 0.5% for 2003 and 2004.

4. Recent productivity data are produced on the basis of preliminary gross domestic product (GDP) estimates, which are eventually revised when additional and more precise information on the National Accounts becomes available.
5. The revised historical data of the Labour Force Survey published in February 2005 are also incorporated, but only partially.
6. Quarterly measures of productivity in the Canadian business sector are now available from 1981 onward. Prior to this publication, the data were available only from 1987.

Even though the revisions for the last two years are significant, they do not alter the fact that there is a Canada–U.S. labour productivity gap for those years.

Canadian businesses outperformed their American counterparts in productivity growth in only one of the past five years: 2000; productivity growth gap was 0.6 percentage points (Table 1a, line 13). Since then, the gap in productivity growth, according to this last round of revisions, varied from 0.8% to 4.3% per year in favour of the United States before revision, compared with 1.0% to 3.7% after revision. From 2000 to 2004, the average annual growth rate was 0.9% in Canada and 3.5% in the United States (see Table 2); U.S. labour productivity growth was almost four times higher than its Canadian counterpart. It should be noted that the period from 2000 to 2004 is short and covers much less than a full business cycle. In the early 1990s, Canada also lagged the United States in productivity growth during a recessionary period, but ended up at approximately the same point by the end of the decade.

It is also important to note that the annual productivity differences reported over the period from 2000 to 2004 are based on preliminary data which are still subject to revision. Since 1998, the Canada–U.S. gap has generally shrunk following revisions to the preliminary data. The revision made to the Canadian productivity estimate in 1999 is almost entirely due to revisions in GDP. Almost half of the change caused by the revision in 2000 comes from this source.[7] During this period, the System of National Accounts has made two changes that increased the rate of growth of output and therefore of labour productivity. First, it started capitalizing software expenditures (the United States had introduced this in 1999). Second, it has gradually been introducing new surveys associated with the Project to Improve Provincial Economic Statistics (PIPES) that has extended coverage of its economic surveys.[8] During this period, the productivity program also revised its estimate of hours worked, downward.[9]

Over a longer period (1981 to 2000), there is a small gap in productivity growth between Canada and the United States. For this period, productivity has grown at an average annual rate of 1.5% in Canada compared with 1.9% in the United States. The recent revisions in June 2005 for Canada and August 2005 for the United States to the productivity estimates had virtually no effect on average annual productivity growth in Canada for the period from 1981 to 2000. The average gap in annual productivity growth in favour of the United States was only 0.4 percentage points.

All things considered, the 2001 to 2004 revisions of GDP in Canada resulted in a narrowing of the gap in productivity growth. The revisions have had little effect on Canada–U.S. differences over the last two decades—from 1981 to 2000. During this period, Statistics Canada's estimates of productivity growth have consistently shown that Canada lagged less than 0.5 percentage points behind the United States. In early 2000, we compared the long-term performance of

7. The remainder came from a revision to the labour statistics.
8. The GDP revisions in 1999 and 2000 came from new benchmarks of manufacturing activity derived from the Project of Improve Provincial Economic Statistics, upward revisions in exports, and the incorporation of software as an investment rather than as an intermediate expenditure. In addition, the productivity program fully integrated its output measure with that produced by the Income and Expenditure Accounts Division.
9. The revisions in hours worked in 2000 came from new information on the methodology actually followed by the Labour Force Survey for the year 2000 but not for other years. The information resulted in an upward adjustment in holidays in this year.

Canada to the United States[10] over the period from 1989 to 1997 and reported that Canada lagged the United States by only a small amount. As of 1999, the average labour productivity growth of the business sector in Canada from 1989 to 1998 was 1.19%[11] while it was 1.34% in the U.S.[12] over the same period. In early 2000,[13] the Americans made major revisions to their National Accounts for much of the 1990s, increasing their average rate of growth between 1989 and 1998 to 1.89%. This widened the Canada–U.S. difference from around 0.15% to over 0.60%. The revisions introduced by the United States increased the rate of growth because computer software was moved from intermediate expenditures to investment and because of a number of improvements in coverage, especially in trade. The recent Canadian revisions covering the years 1999 and 2000, incorporating similar changes on the software side and improvements in coverage due to PIPES, have moved the relationship for the entire 1990s back to the level previously reported.

10. J.R. Baldwin, T.M. Harchaoui and J.-P. Maynard. 2001. "Productivity Growth in Canada and the United States." In *Productivity Growth in Canada*. Catalogue no. 15-204-XIE. Ottawa: Statistics Canada. Chapter 4.
11. As of June 30, 1999.
12. As of October 1999.
13. As of April 9, 2000.

Table 1a Labour productivity, business sector, Canada and United States, annual percentage change, 1997 to 2004

	Daily release	Canada								United States								BLS[1] release
		1997	1998	1999	2000	2001	2002	2003	2004	1997	1998	1999	2000	2001	2002	2003	2004	
After the revisions round in 1997 (annual)	**1999-03-23**	2.9	...	...	...	...	...	...	...	1.7	...	...	...	...	...	...	...	**November 1998**
After the revisions round in 1998 (annual)	**2000-01-18**	2.8	0.6	...	...	...	...	...	...	2.2	2.8	...	...	...	...	...	...	**November 1999**
First estimates published for 1999 (annual)	**2000-05-01**	2.4	0.5	1.4	...	...	...	...	...	2.1	2.7	3.1	...	...	...	...	...	**November 2000**
First estimates published for 2000 (4th quarter)	**2001-03-29**	2.3	1.3	1.7	1.4	...	..	..	...	2.3	2.8	2.8	4.2	...	...	...	...	**2001-06-05**
After the revisions round of 2000 (1st quarter)	**2001-06-25**	2.6	2.2	2.4	1.6	...	..	...	...	2.3	2.7	2.5	3.1	...	...	...	...	**2001-08-07**
First estimates published for 2001 (4th quarter)	**2002-03-14**	2.6	2.1	2.4	1.5	1.2	...	...	...	2.3	2.7	2.5	3.4	2.0	...	...	...	**2002-05-31**
After the revisions round in 2001 (1st quarter)	**2002-06-14**	2.6	1.7	2.9	2.1	0.8	...	...	...	2.3	2.6	2.6	3.0	1.1	...	...	...	**2002-08-09**
First estimates published for 2002 (4th quarter)	**2003-03-14**	2.6	1.7	2.9	2.1	0.8	2.2	...	...	2.3	2.6	2.6	3.0	1.1	4.8	...	...	**2003-06-04**
After the revisions round in 2002 (1st quarter)	**2003-06-12**	2.6	1.7	2.9	3.1	1.2	1.8	...	...	2.2	2.6	2.5	3.1	2.0	5.3	...	...	**2003-08-07**
First estimates published for 2003 (4th quarter)	**2004-03-12**	2.6	1.4	3.3	3.8	1.0	1.9	0.1	...	1.9	2.6	2.9	2.9	2.2	4.9	4.5	...	**2004-03-04**
After the revisions round in 2003 (1st quarter)	**2004-06-11**	2.6	1.4	3.3	3.9	1.4	2.3	0.4	...	1.8	2.7	2.9	2.9	2.5	4.3	4.5	...	**2004-08-10**
First estimates published for 2004 (4th quarter)	**2005-03-10**	2.6	1.5	3.3	3.6	1.7	2.5	0.2	0.0	1.8	2.7	2.9	2.9	2.5	4.3	4.5	4.0	**2005-03-03**
After the revisions round in 2004 (1st quarter)	**2005-06-09**	2.7	2.1	2.8	3.4	1.5	2.1	0.2	0.0	1.9	2.8	2.9	2.8	2.5	4.0	3.9	3.4	**2005-08-09**
Difference short-term revision round		-0.2	1.5	1.1	2.0	0.3	-0.1	0.1	0.0	0.2	0.0	-0.2	-1.4	0.5	-0.8	-0.6	-0.6	

... not applicable

1. Bureau of Labor Statistics.

Note: The shaded areas cover the four-year period of annual revisions that arise from the gross domestic product revision cycle. In Canada, the System of National Accounts revisions are usually made available with the release of the first quarter, while in the United States it is published with the preliminary estimates of the second quarter.

Sources: Canadian data: Statistics Canada; United States data: Bureau of Labor Statistics.

Table 1b Gross domestic product, business sector, Canada and United States, annual percentage change, 1997 to 2004

	Daily release	Canada								United States								BLS[1] release
		1997	1998	1999	2000	2001	2002	2003	2004	1997	1998	1999	2000	2001	2002	2003	2004	
After the revisions round in 1997 (annual)	**1999-03-23**	5.2	...	...	...	...	...	...	...	4.6	...	...	...	...	...	...	...	**November 1998**
After the revisions round in 1998 (annual)	**2000-01-18**	5.3	3.3	...	...	...	...	...	...	5.4	5.1	...	...	...	...	...	...	**November 1999**
First estimates published for 1999 (annual)	**2000-05-01**	5.2	3.3	4.7	...	...	...	...	...	5.2	5.0	4.8	...	...	...	...	...	**November 2000**
First estimates published for 2000 (4th quarter)	**2001-03-29**	5.7	3.9	5.3	5.3	...	...	...	...	5.3	5.0	4.8	5.6	...	...	...	...	**2001-06-05**
After the revisions round of 2000 (1st quarter)	**2001-06-25**	6.0	4.7	6.1	5.2	...	...	...	...	5.2	4.9	4.6	4.6	...	...	...	...	**2001-08-07**
First estimates published for 2001 (4th quarter)	**2002-03-14**	5.9	4.6	6.0	5.2	1.2	...	...	...	5.3	4.9	4.6	4.6	0.9	...	...	...	**2002-05-31**
After the revisions round in 2001 (1st quarter)	**2002-06-14**	5.9	4.5	6.7	5.4	0.9	...	...	...	5.3	4.9	4.7	4.1	-0.1	...	...	...	**2002-08-09**
First estimates published for 2002 (4th quarter)	**2003-03-14**	5.9	4.5	6.7	5.4	0.9	3.8	...	...	5.3	4.9	4.7	4.1	-0.1	2.7	...	...	**2003-06-04**
After the revisions round in 2002 (1st quarter)	**2003-06-12**	5.9	4.5	6.9	6.3	1.3	3.4	...	...	5.3	4.9	4.7	4.1	-0.1	2.7	...	...	**2003-08-07**
First estimates published for 2003 (4th quarter)	**2004-03-12**	5.9	4.5	6.9	6.3	1.3	3.4	1.5	...	5.3	4.8	5.1	3.9	0.1	2.3	3.7	...	**2004-03-04**
After the revisions round in 2003 (1st quarter)	**2004-06-11**	5.9	4.5	6.9	6.3	1.8	3.6	1.7	...	5.3	4.8	5.1	3.9	0.3	1.8	3.8	...	**2004-08-10**
First estimates published for 2004 (4th quarter)	**2005-03-10**	5.9	4.5	6.9	6.3	1.8	3.6	1.7	2.9	5.3	4.8	5.1	3.9	0.3	1.8	3.8	5.1	**2005-03-03**
After the revisions round in 2004 (1st quarter)	**2005-06-09**	5.5	5.1	6.5	6.1	1.6	3.2	1.6	3.1	5.3	4.8	5.1	3.9	0.3	1.5	3.4	4.7	**2005-08-09**
Difference short-term revision round		0.3	1.8	1.8	0.8	0.4	-0.6	0.1	0.2	0.7	-0.3	0.3	-1.7	-0.6	-1.2	-0.3	-0.4	

... not applicable

1. Bureau of Labor Statistics.

Note: The shaded areas cover the four-year period of annual revisions that arise from the gross domestic product revision cycle. In Canada, the System of National Accounts revisions are usually made available with the release of the first quarter, while in the United States it is published with the preliminary estimates of the second quarter.

Sources: Canadian data: Statistics Canada; United States data: Bureau of Labor Statistics.

Table 1c Hours worked, business sector, Canada and United States, annual percentage change, 1997 to 2004

	Daily release	Canada								United States								BLS[1] release
		1997	1998	1999	2000	2001	2002	2003	2004	1997	1998	1999	2000	2001	2002	2003	2004	
After the revisions round in 1997 (annual)	**1999-03-23**	2.3	...	...	...	...	...	...	...	2.9	...	...	...	...	...	...	...	**November 1998**
After the revisions round in 1998 (annual)	**2000-01-18**	2.5	2.7	...	...	...	...	...	...	3.1	2.2	...	...	...	...	...	...	**November 1999**
First estimates published for 1999 (annual)	**2000-05-01**	2.7	2.8	3.3	...	...	...	...	...	3.1	2.3	1.6	...	...	...	...	...	**November 2000**
First estimates published for 2000 (4th quarter)	**2001-03-29**	3.3	2.5	3.5	3.8	...	...	...	...	2.9	2.2	2.0	1.3	...	...	...	...	**2001-06-05**
After the revisions round of 2000 (1st quarter)	**2001-06-25**	3.3	2.5	3.5	3.7	...	...	...	...	2.9	2.2	2.0	1.5	...	...	...	...	**2001-08-07**
First estimates published for 2001 (4th quarter)	**2002-03-14**	3.3	2.5	3.5	3.7	0.0	...	...	...	2.9	2.2	2.0	1.2	-1.1	...	...	...	**2002-05-31**
After the revisions round in 2001 (1st quarter)	**2002-06-14**	3.4	2.8	3.8	3.1	0.1	...	...	...	2.9	2.2	2.0	1.1	-1.3	...	...	...	**2002-08-09**
First estimates published for 2002 (4th quarter)	**2003-03-14**	3.4	2.8	3.8	3.1	0.1	1.5	...	...	2.9	2.2	2.0	1.1	-1.3	-2.0	...	...	**2003-06-04**
After the revisions round in 2002 (1st quarter)	**2003-06-12**	3.4	2.8	3.8	3.1	0.1	1.5	...	...	3.0	2.2	2.1	1.0	-2.1	-2.5	...	...	**2003-08-07**
First estimates published for 2003 (4th quarter)	**2004-03-12**	3.4	3.0	3.6	2.2	0.4	1.4	1.5	...	3.3	2.2	2.1	1.1	-2.1	-2.5	-0.8	...	**2004-03-04**
After the revisions round in 2003 (1st quarter)	**2004-06-11**	3.4	3.0	3.6	2.2	0.4	1.4	1.3	...	3.4	2.1	2.1	1.1	-2.2	-2.4	-0.6	...	**2004-08-10**
First estimates published for 2004 (4th quarter)	**2005-03-10**	3.4	2.9	3.6	2.5	0.1	1.1	1.5	2.8	3.4	2.1	2.1	1.1	-2.2	-2.4	-0.6	1.2	**2005-03-03**
After the revisions round in 2004 (1st quarter)	**2005-06-09**	2.8	2.9	3.6	2.5	0.1	1.1	1.5	3.0	3.3	2.0	2.1	1.2	-2.2	-2.4	-0.5	1.3	**2005-08-09**
Difference short-term revision round		0.5	0.2	0.3	-1.3	0.1	-0.4	0.0	0.2	0.4	-0.2	0.5	-0.1	-1.1	-0.4	0.3	0.1	

... not applicable

1. Bureau of Labor Statistics.

Note: The shaded areas cover the four-year period of annual revisions that arise from the gross domestic product revision cycle. In Canada, the System of National Accounts revisions are usually made available with the release of the first quarter, while in the United States it is published with the preliminary estimates of the second quarter.

Sources: Canadian data: Statistics Canada; United States data: Bureau of Labor Statistics.

Table 2 Average annual growth in percentage of labour productivity, business sector, Canada and United States, 1981 to 2004

Years	Canada	United States
1981 to 2000	1.5	1.9
2000 to 2004	0.9	3.5

Sources: United States data: Bureau of Labor Statistics, "Productivity and Costs, Second quarter 2005," published in *NEWS*, September 7, 2005; Canadian data: Statistics Canada, *The Daily* release of June 9, 2005.

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